

CAMBION[®] product news

PUBLISHED BY CAMBRIDGE THERMIONIC CORPORATION, 445 CONCORD AVE., CAMBRIDGE, MASS. 02138. MAKERS OF CAMBION[®] GUARANTEED ELECTRONIC COMPONENTS

New CAMBION Mini-Connectors Guarantee Design Flexibility ...Save Space...Prove Reliable in System After System

Modern electronic systems demand high density circuit and function packaging with reliable, lightweight, space-saving interconnections. To meet this demand, CAMBION has developed a broad range of standard miniature connectors for the latest in solid state electronic design.

CAMBION defines these miniature connectors as those connector components with lead or pin diameters of .080" (2mm) and smaller. Sizes to .016" (0.4mm) are available from stock or through authorized CAMBION distributors from coast to coast.

Interconnections: Life-Line of System Performance

Circuit engineering and design goes far beyond the package limitations of the circuit itself. Signal and electrical performance must be maintained through each and every connector. To gain the most efficient use of state-of-the-art connectors, complete interconnection links must be considered as an integral part in equipment packaging and systems performance.

New Miniature Connectors for New Miniature Circuits

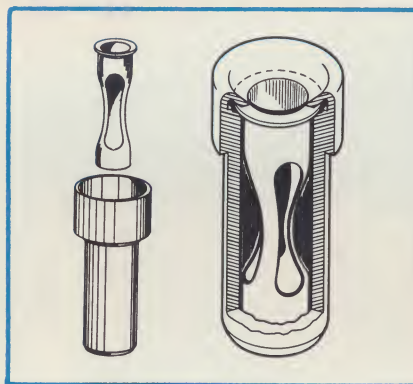


Since the introduction of semiconductors, transistors and integrated circuits, the need for smaller, lighter, more pluggable electronic assemblies, subassemblies, packages and modules has become an urgent requirement.

For interconnecting circuits you can hardly see, the old fashioned banana plugs are completely impractical... if not electrically impossible.

What you need now is a complete source of high reliability connectors in compatible sizes to interconnect modern, miniaturized components, integrated circuits, smaller and smaller multi-layer boards, stacked circuits and other tiny component modules. Designing and producing these connectors you require is a CAMBION achievement. They're available from stock in a wide variety of shapes and sizes. All are thoroughly tested to provide the reliability your circuits demand.

The Squeeze Is on Reliability



The unique CAMBION cage design has one function in life... to provide a conductive spring for the jack. Made of heat-treated beryllium copper specially selected for homogeneity and thickness, the CAMBION Cage Spring has the necessary compliance to accommodate a mating plug while providing consistent contact for repeated insertions and withdrawals. Standard CAMBION test procedures consist of 500 insertion/withdrawal cycles at 600 cycles per hour.

CAMBION Miniature Connectors Quality in Quantity

CAMBION produces hundreds of different basic types of plug and jack connectors in sizes from .016" to .080". These high reliability mini-connectors provide engineers with greater interconnection versatility and flexibility for patching, testing, locking and removing circuits, assemblies and modules, plus fixed con-

nections for total circuit packages and package interconnections.

CAMBION Leads World in Super-Small Miniature Connectors

CAMBION produces more individual mini-connectors than anyone else in the world. Jacks, plugs, sockets, patch strips for both conventional and printed circuit applications; cage jacks, "C" and "D" spring jacks, taper pins and receptacles; combination plug-jacks, patch cord plugs and other miniature connectors are available in more than 1,000 different varieties, including color coded insulated jacks.

CAMBION Cage Jacks are manufactured for component leads and pin diameters of .016", .020", .025", .030", .040", .062" and .080". In addition to the cage design, dimpled "C" and "D" beryllium copper compression spring types are available to mate with .045", .062" and .080" pin diameters.

THE Big Advantage of CAMBION Miniature Connectors

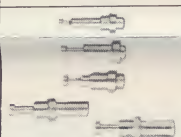
In short, its flexibility. By using CAMBION Miniature Connectors, design engineers can find new and easy ways to incorporate different components... patch-in other circuit boards... hook up integrated circuits... provide the convenience of pluggable/patchable compatibility for hard-wired components... engineer greater current carrying capability with low contact resistance... increase connector packaging density and attain a new level of reliability in circuit interconnection systems.

Local Availability

CAMBION Connectors are available for immediate delivery throughout the United States, Canada, Europe and Middle East. A complete network of stocking distributors maintain up-to-date inventories on all CAMBION Connectors. CAMBION's local shelf service is your way of being sure that when you order CAMBION Components, you get the parts you need when you need them.

CAMBION Miniature Connectors Meet Your Circuit D

CAGE JACKS

Type/Use	Illustration	Insulation	Mounting	Catalog Page†	Part No.	JACK ID FOR PIN DIAMETER							
						.014	.016-.020	.025	.030-.032	.040	.045	.062	.080
Patch cord, MIL bbl		None	Crimp	154.01	450-3367					X			
Patch cord, MIL bbl		Shrink-fit	Crimp	154.01	450-3378					X			
Printed Circuit		None	Solder	150.06 151 150.02 179 152 152.05	450-3268 450-3230 450-7004 450-3366 450-3388 450-3398		X	X	X	X X			X
Printed Circuit		None	Solder	150.05 150.01 150.03	450-3772 450-3703 450-3704		X	X		X			
Printed Circuit		None	Solder	150.05	450-3750	X (ID for Flat Pin, .018W x .011 Thk)							
Single Turret		None	Swage	152.06 152 152.04 150.02 151	450-3266 450-3395 450-3423 450-7005 450-3320		X	X X	X	X			
Printed Circuit		None	Swage	152	450-3394			X					
Jack-jack		None	Swage	152	450-3309			X		X			
Jack-jack & Turret		None	Swage	152.01	450-3392					X			
Slotted Turret		None	Swage	152.03	450-3379					X			
Binding post combination		Molded ABS plastic	D-Shape, Thread	156.01 156.01	450-3284 450-3285					X			X
Single Turret		Teflon	Press	156 156	450-4352 450-4353					X X			
Eye		Teflon	Press	156.02 156.02	450-4354 450-4355								X X
Wire-Wrap* (.025 Sq)		None	Press	150.04 150.04	450-3844 450-3745	X (ID for Flat Pin, .018W x .011 Thk) .022							
PC right-angle side mounted		506-4422** 506-4488**	Tabs	153 152.02	450-3422 450-3888					X			X
Panel, eye, MS		Molded Nylon	Thread	156.03	450-3358								X
Panel, eye, MS		Teflon	Thread	156.03	450-3359								X
Panel, turret, MS		Molded Nylon	Thread	156.03	450-3381								X
Panel, turret, MS		Teflon	Thread	156.03	450-3382								X

OTHER MINIATURE JACKS

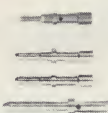
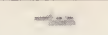
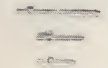
Type/Use	Illustration	Insulation	Mounting	Catalog Page†	Part No.	.014	.016-.020	.025	.030-.032	.040	.045	.062	.080
Single Turret		None	Ring	153	450-3304	(one piece)				X			
Key & C spring		None	Swage	154	450-2320							X	
Key & C spring, turret		None	Swage	155 155	450-2515 450-2265							X	X
C spring, turret		None	Swage	154	450-2378						X		
C spring		Teflon	Press	157	450-4351						X		
Side-mounted		None	Swage, Eyelet	151	450-2655						X		

**Separate insulators

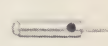
†All page references are CAMBION's latest and complete Catalog 700.
For your free copy, write today.

*Reg. T.M. Gardner-Denver Company

Design Requirements—Save This Chart for Reference

PLUGS						PIN DIAMETER							
Type/Use	Illustration	Insulation	Mounting	Catalog Page†	Part No.	.014	.016-.020	.025	.030-.032	.040	.045	.062	.080
Patch cord		None	Crimp, solder	159	461-3050			X					
				163	460-2379-01 460-2379-02						X	X	
				164	460-2201-02								X
Patch cord		Shrink-fit	Crimp, solder	159	461-3102			X					
Patch cord MIL		None	Crimp, solder	162	460-3308					X			
				162.01	460-3368							X	X
				168	460-3369								X
				168.01	460-3299								X
Patch cord		Nylon	Crimp	164	461-2663						X		
				164	462-2662							X	
Patch cord		Nylon	Crimp, solder	164	461-2661						X		
				164	461-2660							X	
				164	461-2225								X
PC square slotted edge-mounted		None	Eyelet	163	461-2850						X		
				163	461-2319							X	
Edge-mounted		None	Eyelet	163	461-2654						X		
Right-angle bend		None	Swage	162	460-1521					X			
Flared PC		None	Swage	160	460-3889			X					
				163	460-3221						X		
PC		None	Swage	160	460-3393			X					
				158	460-3231			X					
				158	460-2970				X				
				158	460-2971				X				
				163	460-3220					X			
PC thru hole		None	Swage	158	460-3232				X				
				158	460-3233				X				
				158	460-3241				X				
Single turret, feed thru		None	Swage	161	460-3202			X					
Single turret		None	Mold	160	460-3340			X					
Shorting		Molded Polyprop.	Plug	166	461-2871					X			
				166	461-3771					X			
PC flex. cable		None	Ring	161	460-3396					X			

COMBINATION PLUG-JACKS (CAGE-TYPE)

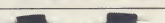
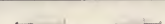
						Plug Pin Dia.	JACK ID FOR PIN DIAMETER					
Type/Use	Illustration	Insulation	Mounting	Catalog Page†	Part No.		.025	.030-.032	.040	.045	.062	.080
Plug-Jack		None	Swage	150.07	450-3263	.025	X					
				151	450-3310	.040			X			
Piggyback patch cord		None	Solder	166.03	450-3078	.025	X					
				166.01	450-3302	.040			X			
Piggyback patch cord		Shrink-fit	Solder	166.03	450-3390	.025	X					
				167	450-3301	.040			X			
Plug-Jack Adapter		None	Plug-in	152.07	450-3278	.040						X
		Polyolefin	Plug-in	152.07	450-3279	.040						X

Note: Connector illustrations are for general configuration only. For size reference see plug or pin diameter.

OTHER COMBINATION PLUG-JACKS

Type/Use	Illustration	Insulation	Mounting	Catalog Page†	Part No.	Plug Pin Dia.	JACK ID FOR PIN DIAMETER					
							.025	.030-.032	.040	.045	.062	.080
Key & C spring		None	Swage	155	450-2317	.080						X
C spring		None	Swage	154	450-2650	.045				X		
C spring		Shrink-fit	Solder	154	450-3103	.045				X		

PATCH CORDS

Type/Use	Illustration	Insulation	Mounting	Catalog Page†	Part No.	Plug Pin Dia.	JACK ID FOR PIN DIAMETER					
							.025	.030-.032	.040	.045	.062	.080
MIL plug		Shrink-fit	Pre-Assembled Patch Cords With Insulated Wire	166	445-3306	.040			X			
Non-MIL plug		None		165	445-1470	.045				X		
Non-MIL plug		Nylon		165	445-1471	.045				X		
Plug-jack		Shrink-fit		166.02	445-3389	.025	X					
				167	445-3300	.040			X			
Plug-jack		Molded ABS plastic		166.01	445-3705	.040			X			

TAPER RECEPTACLES

Type/Use	Illustration	Insulation	Mounting	Catalog Page†	Part No.	Series .037	Series .053	Bottom Taper .061	Top Taper .061	# Turrets
Taper receptacle		None	Swage	170	465-1015		X	X		
Receptacle/terminal		None	Swage	170	465-2186		X		X	1
Receptacle/terminal		None	Swage	171	465-2114		X		X	2
Receptacle/terminal		None	Swage	171	465-2113		X	X		2
Receptacle/terminal		None	Swage	171	465-2132		X	X	X	2
Feed thru		None	Swage	171	465-2115		X	X	X	1 Ea. End
Receptacle/terminal		None	Swage	170.01	465-1762	X			X	1

TAPER PLUGS

Type/Use	Illustration	Insulation	Mounting	Catalog Page†	Part No.	Series .037	Series .053	Bottom Taper .061	Plug Taper .061	# Turrets
Feed thru		None	Swage	170	465-1017	X			X	2
Feed thru plug/Receptacle		None	Swage	170	465-1799		X	X	X	1
Feed thru		None	Swage	168	465-1016	X			X	1
Patch cord, MIL bbl		None	Crimp	169	465-1781		X		X	

Confidence Level of Circuits Reaches New High with Cage Jack Design

The housed cage-jack is a CAMBION creative design which combines the best features of dependable spring contact and mechanical strength of its housing with superior package versatility for the utmost circuit design confidence.

There's No Room for Doubt

CAMBION has developed complete electrical, mechanical and environmental test programs to prove performance requirements; workmanship; the test methods themselves; and quality assurance provisions.

Operating requirements tests include pins used for insertion/withdrawal tests; current carrying capacity; contact po-

tential drop; insulation resistance; dielectric withstanding voltage; insertion and withdrawal forces; temperature cycling; durability; vibration; shock; moisture resistance; corrosion resistance and crimp tensile strength. Workmanship tests assure that the assembled connectors comply with the dimensional and design requirements of CAMBION drawings. Test methods include electrical and mechanical tests to prove proper metal fixtures, panels or printed mounting boards. Quality assurance provisions specify CAMBION as responsible for the performance of all requirements of qualification inspection and quality conformance inspection.

Inside Inside-out Cage . . . Makes a Better Jack Design

These Product Features Prove It:

- Stamped, burr-free heat-treated beryllium copper spring/conductor . . . form configured to specific pin diameters.
- Compound curvature spring.
 - Longitudinal and circumferential contact — held by 250 pound pressure.
 - 60% contact around mating pins (some competitive springs have at the most two point contact, with the plug circumference. This permits the plug to move from side to side inside the jack and reduce the contact surface. Hardly an assurance for reliability.)
- Plating: Per MIL-G-45204 (.000050" gold plate over gold flash over .0002" copper plate.)

No Room for Failures

CAMBION Miniature Cage-Jacks are

small, unitized, connection systems designed and produced to meet these criteria:

Durability — Standard mating pins are fully inserted into the connector socket and withdrawn for a total of 500 insertions and withdrawal cycles, at a rate not to exceed 600 cycles per hour.

Vibration — Completely mated connectors and standard mating pins are vibrated in accordance with MIL-STD-202. All connectors are wired in series with the appropriate size wire and connected to a suitable testing circuit. Wires are supported on a stationary frame and secured in such a manner that there is a minimum of three inches of slack in the three foot lead. Upon completion of testing, there is no evidence of any physical damage.

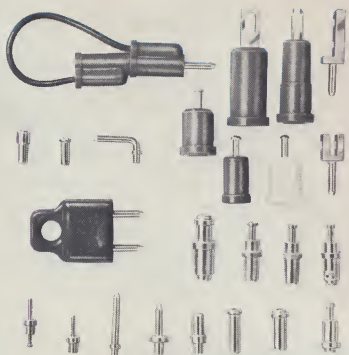
Shock — Completely mated connectors and standard mating pins are tested in accordance with MIL-STD-202. Each mated assembly is subjected to an acceleration of 50 gravity units. Direction of blows is three in each of three mutually perpendicular planes. A total of nine blows. Each connector is monitored for its normal means and shall be wired in series with the appropriate size wire. After the test, there is no evidence of any mechanical damage.

Current Rating — Unless otherwise stated, the current ratings are as follows:

Connector Size	Connector Diameter	Test Current Ratings In Amperes
14	.080"	5
20	.040"	5
24	.025"	3

Design — Socket connectors are of a closed-entry design, whereby a spring action maintains the contact pressure between the standard mating pin and socket. Connectors accept Standard Mating Pins .080" $\pm$.001", .040" $\pm$.001 and .0250" $\pm$.0005" in diameter and exclude the entrance of Standard Mating Pins which are 0.005" or more over the nominal diameter for the .080" and .040"; .003" for the .0250".

Hundreds of Standard Jacks and Plugs Available for Quick, Tight, Space-Saving Connections



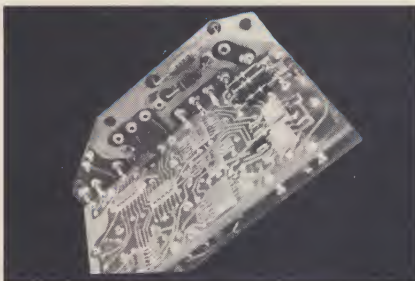
In addition to mini-connectors for conventional circuits, printed circuit and patch board types can also be ordered for swaged, hand and dip soldered, threaded, retaining ring and clip mounting. CAMBION Press Mount "Teflon" Insulated Jacks come in ten different colors to facilitate circuit coding and tracing.

*T.M. Reg. Trademark of DuPont

Standard combinations consist of jack-jack and plug-jack, piggyback jack-plug and straight or right-angle plugs. These unusual connector combinations are designed to facilitate stacking of patch cords and components. This double capability makes these components particularly useful in production, as well as patching and breadboarding.

Snap-on and shrink fit insulating sleeves in a range of colors are also available. Assembled patch cords, with or without piggyback capability are offered in several convenient configurations.

The List of Applications Grows and Grows and Grows and . . .



CAMBION Miniature Connectors . . . in the air



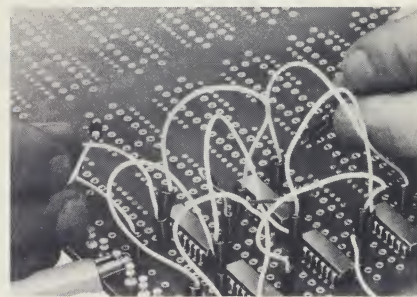
Supersonic Concorde aircraft contains thousands of CAMBION Cage Jacks in on-board electronic warning and control devices, as well as associated ground equipment check-out consoles.

. . . in life-sustaining heart pacers



Flawless dependability is demanded of Cordis Atriacor and Ventricor Pacers, implanted near the human heart. Four CAMBION Jacks molded into contact portion of Cordis Pacers provide reliable terminus for electrode control of heart muscles.

. . . in high density circuits



CAMBION Cage Jacks are ideally suited as high density connectors for rack-and-panel, PC board, and jumper wiring. Cage-jacks can also be mounted on front panels or individual printed circuit cards to provide test point facilities.

Current carrying capacities for CAMBION Plugs:

Pin diameter	Ratings are based on maximum voltage drop of three millivolts	
	Maximum current carrying capacity	
.025"	8 amps.	
.040"	12 amps.	
.045"	12 amps.	
.062"	13 amps.	
.080"	15 amps.	

Tolerances, unless otherwise noted, are $\pm$.005" on decimals, except for shank diameters, for which tolerances are shown on individual drawings. Tolerances for plug-in diameters are held to $\pm$.001".

Military and federal specifications for materials and finishes in accordance with the latest revisions are met and often exceeded by CAMBION Miniature Connectors.



CAMBION Connector Assemblies with Multiple Receptacles

Patch strip assemblies, with taper jacks, regular jacks and combinations on each side allow permanent connections, frequent insertions and extractions or both. Jacks are numbered on both sides for convenient programming and assembly. Assemblies can be stacked either vertically or horizontally to any desired configuration — up to 400 connections can be achieved in a space just 4" x 5".

Need More Details on CAMBION Mini- Connectors?

Call for Catalog 700—
New, Revised Edition
Ready Now.

New Integrated Circuit Patch Cord Kit from CAMBION® Speeds Circuit Design

The first and only one of its type available, this kit contains 100 assorted .040" dia. patch cords arranged by color, length and style for specific use with CAMBION® integrated circuit breadboards and the many CAMBION® circuit boards. This new kit meets the circuit designers' need for patch cord selection in assembly mock-ups.



We're looking for hard-nosed design engineers

who want to make the best investment in IC logic assemblies.

It's a buyer's market. Now you can get exactly the right logic cards to design your logic system the way you want them... without settling for full-cost cards from general purpose computers... and without going to all the expense of building specials.

CAMBION® makes the odd-ball IC assemblies as standard... along with all the regulars. You're never stuck for the right logic card, even if you need only one. You design your systems with all compatible cards... spend less time in repeated back wiring and less time debugging back wiring. Think of the money you'll save.

CAMBION's exclusive guide plates 70-pin input/output is the key to your investment. It lets you bring more functions through to the outside world... reduces the total number of circuit connections... and provides for large-scale integration... now.

*Reg. U.S. Pat. Off.

Standardize on CAMBION

We have something for no-nonsense design engineers

who want to make the best investment in IC logic assemblies.

Design with CAMBION® IC Logic Assemblies. You get more for your money... more functions on every logic card... an exclusive 70-pin input/output that lets you bring more functions through to the outside world.

With this unique connector capability, we've developed both standard and those hard-to-find cards... grey code logic, arithmetic logic, counters, decoders, registers, comparators... all the odd-ball assemblies you need.

Look at these advantages:

- SPEED**—IC logic assemblies with speeds to 25 MHz.
- NOISE**—Exact component locations with precision etched interconnections achieve "short-leads" and prevent signal cross-coupling. IC CD counters with decoder/inputs drivers all on a single card are best one example.
- PACKAGE DENSITIES**—70-pin input/output, plus a great array of complex functions and you've got what it takes for high-density packages. (You use fewer cards this way too.)
- VARIETY**—Over 250 card types for different applications.
- DELIVERY**—Immediate... from stock... honestly.
- DOCUMENTATION**—CAMBION's new logic manual has the data, including sophisticated and helpful reference formulas.
- NO-NONSENSE**—Make the best investment in IC logic assemblies. Send for new manual.

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CAMBION®
the guaranteed logic assemblies

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Standardize on CAMBION... the guaranteed logic assemblies

CAMBION Breaks the Logic Barriers

No need to confine your design to a few IC logic assemblies when you choose CAMBION. Specials, odd-ball assemblies, ordinary types... they're all standard with CAMBION and available off the shelf.

... get exactly the right logic cards you need to design logic systems the way you want them... without settling for out-cards from general purpose computers... and without going to all the expense of building specials.

CAMBION makes all the odd-ball IC assemblies as standard... grey code logic cards, arithmetic logic cards, counters, decoders, registers, comparators... plus all the regulars.

Compare CAMBION IC Logic Assemblies with all the others... prove for yourself why CAMBION logic makes your best investment in IC logic assemblies:

- speeds to 25 MHz
- low noise
- 70-pin input/output
- over 250 card types to choose
- immediate delivery



CAMBION's latest comprehensive logic manual has all the data. To get your free copy, call or write Cambridge Thermionic Corporation, 473 Concord Avenue, Cambridge, Massachusetts 02138. Phone: (617) 491-5400. In Los Angeles, 8703 La Tijera Boulevard. Phone: (213) 776-0472.

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